

CHEVRON RICHMOND REFINERY

TENTATIVE ORDER AND NPDES PERMIT

REQUEST FOR *COMPLIANCE SCHEDULE* AND DEMONSTRATION OF INFEASIBILITY TO ACHIEVE IMMEDIATE COMPLIANCE WITH CALCULATED EFFLUENT LIMITATION FOR **COPPER**

Executive Summary

Pursuant to discussions with staff and to §2.1 of the SWRCB's *Policy for Implementation of Toxics Standard for Inland Surface Waters, Enclosed Bays, and Estuaries of California* [the "SIP"], Chevron submits as an addendum to its NPDES permit application a request for a compliance schedule and Chevron's documentation that it is infeasible to meet the final limits for copper proposed in the RWQCB's tentative order.

Copper is a CWA §303(d)-listed constituent. Its presence in the refinery wastewater occurs at very low levels (<20 ug/L in the effluent). Copper tends to be ubiquitous in the regional environment including stormwater, as well as Chevron's makeup water from EBMUD and is present in alloys used in refinery process equipment.

Because copper is a §303(d)-listed constituent, ultimately a final limit for copper will be based on a TMDL and a waste load allocation (WLA) for the refinery. Notwithstanding that the TMDL has not been completed, the permit writer has proposed a WQBEL for copper in the tentative order of 11 ug/L average monthly effluent level (AMEL) and 27 ug/L maximum daily effluent level (MDEL). Chevron cannot currently consistently comply with the AMEL limit today, or in the near future.

Infeasibility Demonstration.

In support of its request, Chevron submits the following demonstration that it is infeasible to achieve immediate compliance with the 11 ug/L AMEL, and 27 ug/L MDEL for COPPER

As defined in the SIP, infeasible means

“not capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors”

In this case, the SIP defines a “reasonable period of time” to be “immediate.” Therefore, in cases where, as here, the actions needed to achieve compliance could not be implemented by the permit’s effective date, they could not be completed within a reasonable period of time. In addition to this timing factor, possible actions to achieve compliance must be evaluated in light of the defined factors to determine their feasibility.

Staff has calculated a proposed final Water Quality Based effluent of 11 ug/L AMEL, and 27 ug/L MDEL. Chevron’s performance history relating to this constituent reflects that Chevron’s effluent does not meet this limit. Further, as explained in greater detail below, Chevron has undertaken a variety of efforts to date to reduce its discharge loading as much as possible and cannot achieve immediate compliance with the proposed final limits for the following reasons:

- Source of the contaminant is generally known, as described elsewhere in this document, but we need to develop additional information on the quantity and variability of the principle source(s) before we can develop additional appropriate measures for control
- Because is generated from several sources in the refinery but at levels already below what treatment technology is expected to achieve, additional treatment at the sources is currently deemed both ineffective and impractical
- If any major projects were to be generated as the result of identifying additional practical treatment or source control technologies, we would have to go through a permitting process and might trigger CEQA and an environmental impact analysis. Permitting and CEQA processes can be very time consuming.
- A detailed program to develop alternative feasibility technologies may be required, as outlined below.

Given the efforts to date, it is unclear what additional actions and measures may be necessary to meet that limit. A number of steps will be needed to determine what actions may be necessary and feasible in order to achieve compliance with this limit. Those steps will involve additional studies to evaluate future options, and those studies may demonstrate that new technology or new methods are necessary, appropriate and feasible. For example, Chevron may evaluate options, using criteria such as the following:

- Known, demonstrated technology that is available and has been demonstrated in refineries or related industries;

- Ability to achieve required effluent levels;
- Ability to pilot or demonstrate the technology in Chevron's plant;
- Implementation time for a given technology;
- Feasibility and cost effectiveness.

Certainly, carrying out these steps will be costly and time-consuming and may require additional environmental analyses and permits. In any case, they can not be completed and implemented in time for this permit to go into effect.

For the reasons discussed above, Chevron believes it is infeasible to achieve immediate compliance with the proposed effluent limit for COPPER.

In the following sections Chevron will document:

- A. Diligent efforts made to quantify pollutant levels in the discharge and the sources of the pollutant in the waste stream, and the results of those efforts;
- B. Source control and/or pollution minimization efforts currently underway or completed;
- C. A proposed schedule for additional or future source control measures, pollution minimization actions, or waste treatment;
- D. A demonstration that the proposed schedule is as short as practicable.

A. Pollutant Levels and Sources.

Final Limits. The proposed WQBEL final limits for copper are:

AMEL: 11 ug/L

MDEL: 27 ug/L

Effluent data: Copper is monitored monthly in refinery effluent. Table 1.0 summarizes copper data for the last three years. These data show:

- The average effluent copper was 3.9 ug/L
- The maximum observed value was 9.5 ug/L
- The 99.87%tile of copper observations during the life of the permit is estimated to be 14.1 ug/L assuming a log normal distribution. This value exceeds the monthly average by 28%. We anticipate that something like 10% of the data may exceed the AMEL.

Sources: Sources of copper to the Effluent Treatment System include the following: corrosion of copper/nickel (Cu/Ni) alloy bundles in cooling water service, water generated during catalyst changes (specifically wet dumps),

potable and reclaimed water, groundwater, and as a natural occurring component of crude oil.

- Cu/Ni Alloy Bundles: Nickel/Copper alloy bundles are located in many locations throughout the Refinery's process units. Cooling water service constitutes the majority of Cu/Ni bundles. These bundles may corrode as a result of exposure to re-circulating water; circulated between process heat exchangers and the cooling water towers. Blowdown from cooling water towers is discharged to the Effluent Treatment System and may contain small amounts of corrosion by-products. Blowdown is necessary to maintain operational control limits on total dissolved solids. Another source of copper from alloy bundle corrosion is during No. 4 Rheniformer catalyst regeneration where corrosion of the heat exchanger tubes may occur during the regeneration process. Vent gases from this process are water scrubbed, and the water is discharged to the Effluent Treatment System.
- Catalyst Changeouts: Another source of copper arises from water generated during catalyst change outs. Not all catalyst change-outs have associated wastewater generation, particularly precious metal catalysts, where it is economic to recycle the metals. Most other catalyst change outs involve water. To a limited extent, copper chemically plates onto certain catalysts in the hydrocracking process where heavy feeds are converted to lighter high value product (although this process is more important as a source of the nickel in refinery effluent). A "wet dumping" process is used to remove catalyst from the reactor at the end of the catalyst life during the chemical cleaning process. This wet dumping process is required due to the need for high-pressure water to dislodge the catalyst from the column and for safety in catalyst handling. The catalyst/water mixture is then processed to separate, and remove, the catalyst for hazardous waste disposal in a clarifying process. The clarified water containing small concentrations of metals is then assessed for discharge to the Effluent Treatment System.
- Groundwater: As part of the Groundwater Protection System (GPS) groundwater is extracted along the Refinery's perimeter and discharged into the Refinery effluent system. The GPS is designed to create a hydraulic barrier around the refinery's perimeter to prevent the offsite migration of groundwater contaminants. While we have limited data on the copper content of the extracted groundwater, a review of groundwater analytical data from upgradient monitoring wells indicates the presence of dissolved copper.
- Potable / Reclaimed Water: Both potable water and East Bay Municipal Utility District (EBMUD) reclaimed water (tertiary treated-wastewater) contain measurable amounts of copper, probably as the result of potable water delivery systems containing copper, brass, or other copper alloys.

The Refinery currently receives approximately 10.5 million gallons/day from these two water sources; of which 3 million gallons a day is currently reclaimed water. Reclaimed water and potable water are used as cooling water make-up as the towers lose water through evaporative cooling and blowdown. Potable water is also used for steam generation, landscaping, and other process uses including crude oil desalting, tank cleaning, amine dilution, and in sour water concentrators. Water used for steam generation is processed through the Reverse Osmosis Plant to remove/reduce dissolved solids with the concentrated reject water sent to the Effluent Treatment System.

The refinery studied the copper levels in cooling tower blowdowns, including the three cooling towers using reclaimed water and found that

- The FCC tower had about 60 ug/L copper in the blowdown, about 90% of which was dissolved;
- The RLOP tower had about 130 ug/L copper in the blowdown, nearly all of it dissolved;
- The Isomax tower had about 90 ug/L copper in the blowdown, about 85% of it dissolved.
- The other tower blowdowns were either lower than these in copper concentration, or were deemed to be insignificant because of small size.

B. Minimization / Reduction Practices: Current copper and nickel minimization efforts focus on measures to minimize corrosion of the copper alloy bundles in cooling water service and to minimize the discharge of catalyst solids with wet catalyst dumps.

- Cooling Water Chemical Controls: Copper contributions to the effluent system from cooling water towers are currently minimized with the use of chemical corrosion inhibitors, and through pH monitoring and control. This chemical corrosion inhibitor application applies a protective film to the body of the Cu/Ni or other copper alloy bundles protecting them from the corrosive effects of cooling water. Corrosion is also monitored in the form of Admiralty (brass) Coupon analysis; coupons are placed in the tower basins and in side streams and monitored for signs of corrosion over time. Cooling water concentrations of copper may increase with the use of EBMUD reclaimed water, but no noticeable increase has been documented to date. The Refinery currently has three cooling water towers (Isomax, RLOP, and FCC) utilizing reclaimed water. Use of reclaimed water is benefit to the community because it replaces potable water (which is therefore available for a higher use elsewhere) and to some degree it reduces the amount of contaminants which would be released to the bay if this sewage were discharged directly instead of being reused.

- Wet Dumping of Spent Catalysts: The process of "wet dumping" of spent catalysts is known to be a source of copper. This minimization process involves clarifying wet-dump washwater in a system that minimizes particulates, and thus metals in the wastewater. Catalyst fines are then separated out for off-site disposal and the segregated water discharged to the Effluent Treatment System.

C. Pollution Minimization Actions and Schedule

The Discharger agrees to participate in the development of a TMDL for COPPER. The Discharger will give a written annual update to the RWQCB staff to document the discharger's participation toward development of the TMDL.

Chevron will conduct any source control or pollution minimization studies in accordance with California Water Code §13263.3 and §2.1 of the SIP. In accordance with CWC §13263.3, this work will proceed outside of the NPDES permit itself, and will not be a condition of this permit.

D. Why schedule is as short as practical.

The Discharger and the RWQCB staff both recognize that the development of TMDLs will likely take longer than the permit term. The schedule for adoption of the TMDL determines the length of the compliance schedule and, on that basis, is as short as possible. The Discharger agrees to work with the staff to again evaluate the length of the compliance schedule during consideration of the Discharger's next NPDES permit.

COPPER Infeasibility Evaluation Data, May 2001

Table 1.0

Chevron Richmond Refinery

3 Year Evaluation Period: November 1997 to October 2000*

* - Data based on existing permit application submittals

			Copper (0.030 mg/l - Order 92-111)					
	Days/Mth	(A) Flow mmgpd, Average monthly based on daily data		mg/l (ppm)	Lbs/day based on daily flowrate average (Col A)	Monthly Average Mass Loading, lbs/mth (Col A)	RAAM (lb/mth basis) based on Average monthly flowrate, daily data	RAAM (lb/day basis) based on Average monthly flowrate, daily data
	Nov-97	30		0.0050	0.3480	10.4396		
	Dec-97	31		0.0030	0.2509	7.7764		
	Jan-98	31		0.0030	0.3029	9.3906		
	Feb-98	28		0.0044	0.7200	20.1611		
	Mar-98	31		0.0064	0.4315	13.3763		
	Apr-98	30		0.0030	0.1685	5.0546		
	May-98	31		0.0039	0.1984	6.1499		
	Jun-98	30		0.0039	0.1754	5.2609		
	Jul-98	31		0.0030	0.1304	4.0434		
	Aug-98	31		0.0030	0.1142	3.5389		
	Sep-98	30		0.0030	0.1169	3.5074		
	Oct-98	31		0.0030	0.1465	4.5401	7.77	0.2586
	Nov-98	30		0.0030	0.1665	4.9945	7.32	0.2435
	Dec-98	31		0.0030	0.1998	6.1932	7.18	0.2392
	Jan-99	31		0.0030	0.1762	5.4636	6.86	0.2287
	Feb-99	28		0.0030	0.2704	7.5706	5.81	0.1912
	Mar-99	31		0.0000	0.0000	0.0000	4.69	0.1553
	Apr-99	30		0.0030	0.1697	5.0921	4.70	0.1554
	May-99	31		0.0016	0.0642	1.9909	4.35	0.1442
	Jun-99	30		0.0095	0.3559	10.6759	4.80	0.1592
	Jul-99	31		0.0030	0.1029	3.1897	4.73	0.1569
	Aug-99	31		0.0030	0.1277	3.9580	4.76	0.1581
	Sep-99	30		0.0030	0.1066	3.1995	4.74	0.1572
	Oct-99	31		0.0064	0.3023	9.3710	5.14	0.1702
	Nov-99	30		0.0079	0.3433	10.2978	5.58	0.1849
	Dec-99	31		0.0049	0.2293	7.1075	5.66	0.1874
	Jan-00	31		0.0071	0.5934	18.3965	6.74	0.2221
	Feb-00	29		0.0064	0.8529	24.7348	8.17	0.2707
	Mar-00	31		0.0049	0.3905	12.1056	9.18	0.3032
	Apr-00	30		0.0055	0.2635	7.9035	9.41	0.3110
	May-00	31		0.0028	0.1414	4.3823	9.61	0.3175
	Jun-00	30		0.0021	0.1008	3.0230	8.97	0.2962
	Jul-00	30		0.0067	0.3344	10.0305	9.54	0.3155
	Aug-00	31		0.0021	0.0931	2.8847	9.45	0.3126
	Sep-00	30		0.0011	0.0505	1.5146	9.31	0.3079
	Oct-00	31		0.0026	0.1189	3.6859	8.84	0.2926
			4/97 - 3/00	mg/l	lbs/day	lbs/mth	lbs/mth	lbs/day
Count			Limit (ppm)	0.0300				
36			Min	0.0000	0.0000	0.0000	4.3496	0.1442
			Avg	0.0039	0.2405	7.2501	6.9326	0.2296
			Max	0.0095	0.8529	24.7348	9.6102	0.3175